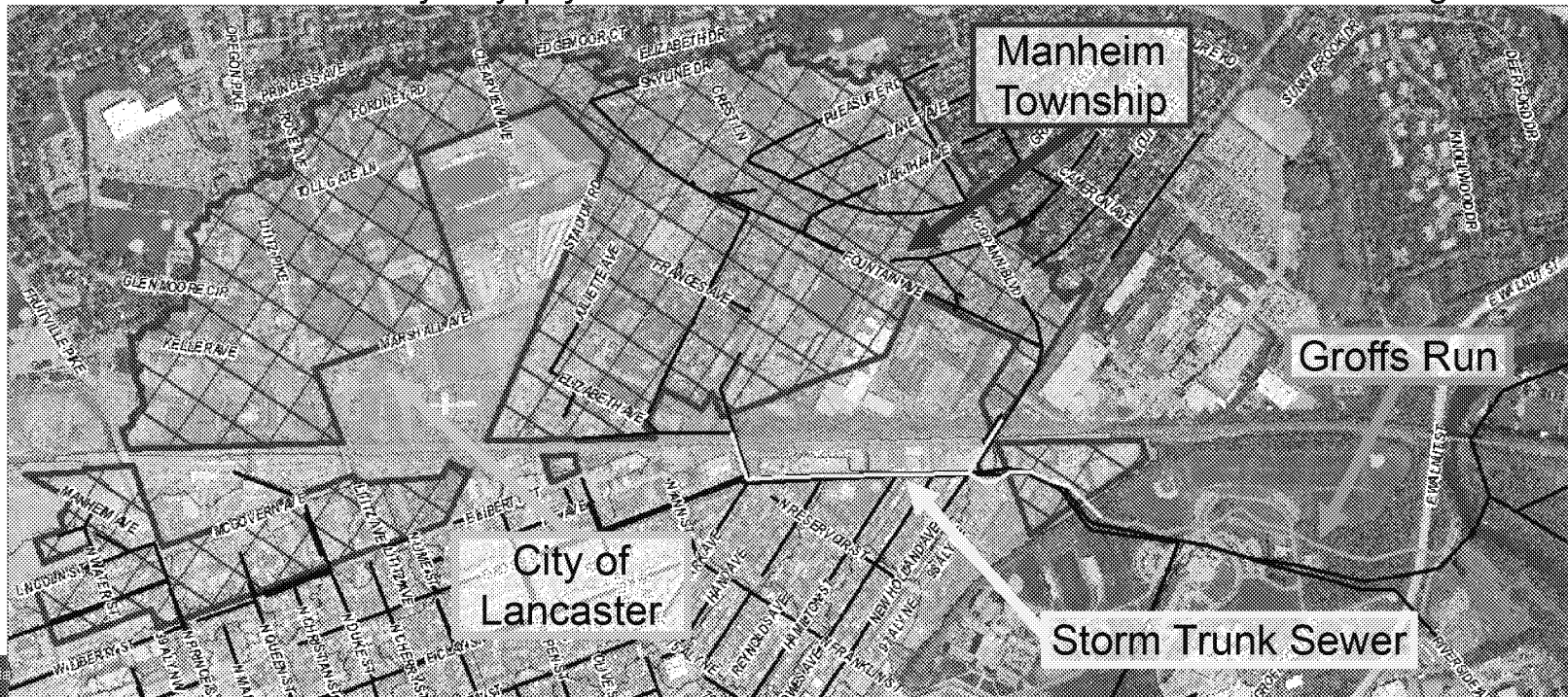


Manheim Township Flow Removal Alternative Overview

- Storm Separation
 - Estimated capital cost: \$13.3 M, based on design for 5-year event
 - Component benefit; cost sharing
- Groffs Run Restoration (~2,800 ft)
 - Estimated conceptual restoration capital cost: \$5.3 M
 - Disconnection Analysis for City Combined Area (e.g., like Northwest Linear)
- **Total estimated conceptual capital cost: \$18.6 M**
 - Recommended that City only pay incremental cost to accommodate its flow in the design

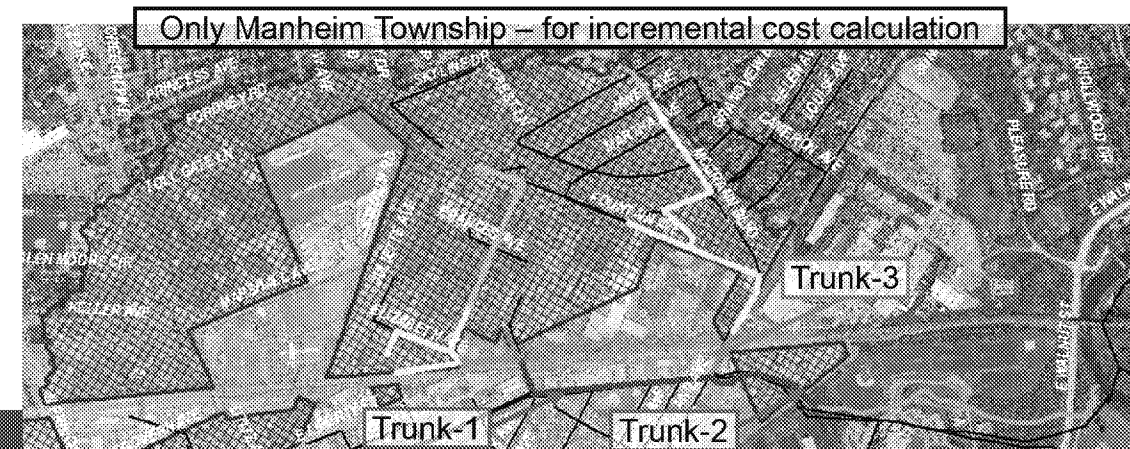
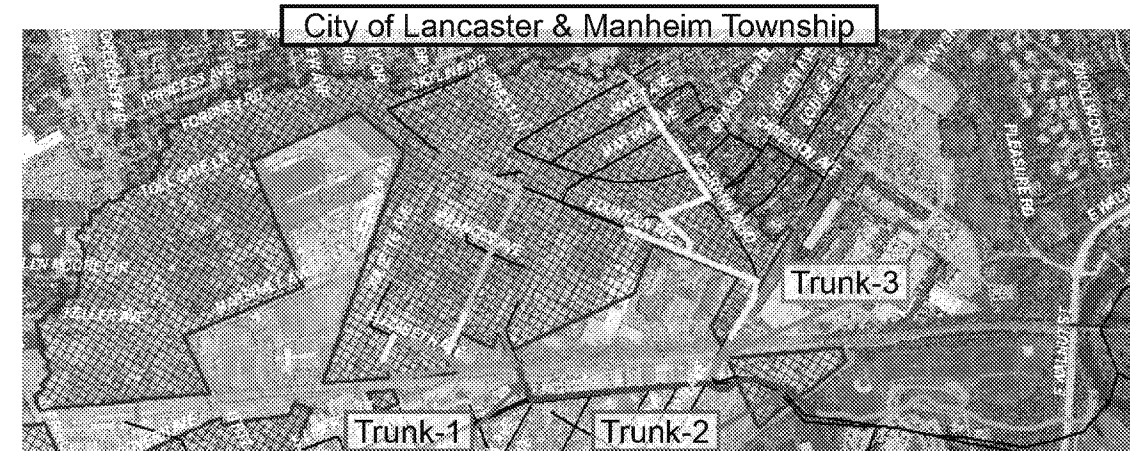
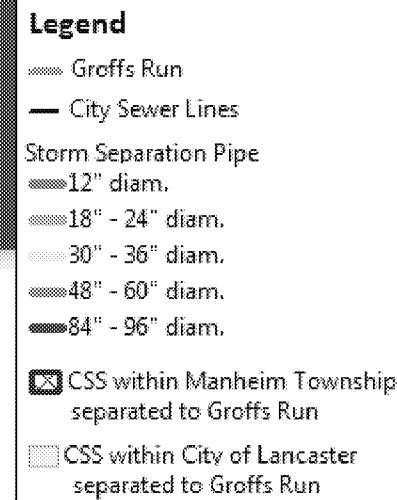
Estimated Overflow Reduction: 51 MG



Manheim Township Flow Removal Storm Separation

- Estimated Conceptual Capital Cost: \$13.3 M, includes:
 - New storm trunk sewers, sized based on 5-year design event
 - New storm pipes to run parallel to existing combined pipes (see conceptual locations in images to right)
 - Increased length by 20% for 12" pipes, 10% for 18" pipes and 5% for 24" pipes to be conservative
 - Connections to new/existing inlets
 - Increased estimated number by 25% for City & Manheim Twp alternative
 - Increased estimated number by 15% for Manheim Twp only alternative
 - Assumed half of the existing inlets would need to be replaced
 - Pipe depth assumed by 5' of cover of new pipe
 - New manholes every 300 ft
 - New junction box at New Holland Ave & Ross St (new trunk sewer intersection)
 - Dewatering, maintenance of flow, and traffic maintenance
 - Capital cost multipliers:

Multipliers Description	Multiplier
Administration Costs-Design, Legal Fees, & Construction	4%
Project Contingencies	25%
Interest (for 1 year of construction only assumed)	1%
Miscellaneous - PTL, test bore, ECI Inspector, R/W	4%
Field Engineering & Inspection	5%
Design & Eng. Services	10%
Program Management	1%
Planning & Preliminary Design	2%
Performance Bond	1%
Total Multipliers =	53%



Manheim Township Flow Removal

Storm Separation – PACC tool

City of Lancaster & Manheim Township														Sanitary Sewer Construction	In Rock	Dewatering Required	Maintenance of Flow	Brownfields	Clearing and Grubbing	Traffic Maintenance Required	Urban Alignment	Total Cost Per Segment
Segment ID	*Pipe Size (in)	Length of Pipe in Street (ft)	Length of Pipe out of Street (ft)	**Average Depth (ft)	# of inlet connects	# of Aband'd Inlets	# of New Inlets	# of Water Services Replaced	Street Width (ft)	# of Manholes	# of Junction Boxes	# of Existing MH Surface Rehabs	Small Medium or Large Creek Crossing (S,M, or L)									
Trunk-1	84	1912	0	12	0	0	0	0	12	7	1	0		N	N	Y	Y	N	N	Y	N	\$ 2,531,786
Trunk-2	96	1096	0	13	0	0	0	0	13	4	1	0		N	N	Y	Y	N	N	Y	N	\$ 1,828,518
Trunk-3	60	434	0	10	0	0	0	0	10	2	0	0		N	N	Y	Y	N	N	Y	N	\$ 327,207
12" pipes	12	699	0	6	0	0	0	0	8	3	0	0		N	N	Y	Y	N	N	Y	N	\$ 173,453
18" pipes	18	508	0	6.5	0	0	0	0	8	2	0	0		N	N	Y	Y	N	N	Y	N	\$ 138,927
24" pipes	24	1603	0	7	0	0	0	0	8	6	0	0		N	N	Y	Y	N	N	Y	N	\$ 487,876
30" pipes	30	3142	0	7.5	0	0	0	0	8	11	0	0		N	N	Y	Y	N	N	Y	N	\$ 1,122,973
36" pipes	36	1337	0	8	0	0	0	0	8	5	0	0		N	N	Y	Y	N	N	Y	N	\$ 576,557
48" pipes	48	1070	0	9	0	0	0	0	9	4	0	0		N	N	Y	Y	N	N	Y	N	\$ 626,436
60" pipes	60	543	0	10	0	0	0	0	10	2	0	0		N	N	Y	Y	N	N	Y	N	\$ 403,909
Inlet Connect	0	0	0	0	83	0	0	0	0	0	0	0		N	N	Y	Y	N	N	Y	N	\$ 313,740
New Inlets	0	0	0	0	0	0	42	0	0	0	0	0		N	N	Y	Y	N	N	Y	N	\$ 190,512

Only Manheim Township – for incremental cost calculation														Sanitary Sewer Construction	In Rock	Dewatering Required	Maintenance of Flow	Brownfields	Clearing and Grubbing	Traffic Maintenance Required	Urban Alignment	Total Cost Per Segment
Segment ID	*Pipe Size (in)	Length of Pipe in Street (ft)	Length of Pipe out of Street (ft)	**Average Depth (ft)	# of inlet connects	# of Aband'd Inlets	# of New Inlets	# of Water Services Replaced	Street Width (ft)	# of Manholes	# of Junction Boxes	# of Existing MH Surface Rehabs	Small Medium or Large Creek Crossing (S,M, or L)									
Trunk-1	72	1912	0	11	0	0	0	0	11	7	1	0		N	N	Y	Y	N	N	Y	N	\$ 1,975,978
Trunk-2	84	1096	0	12	0	0	0	0	12	4	1	0		N	N	Y	Y	N	N	Y	N	\$ 1,532,012
Trunk-3	48	434	0	9	0	0	0	0	9	2	0	0		N	N	Y	Y	N	N	Y	N	\$ 257,312
12" pipes	12	699	0	6	0	0	0	0	8	3	0	0		N	N	Y	Y	N	N	Y	N	\$ 173,453
18" pipes	18	508	0	6.5	0	0	0	0	8	2	0	0		N	N	Y	Y	N	N	Y	N	\$ 138,927
24" pipes	24	1603	0	7	0	0	0	0	8	6	0	0		N	N	Y	Y	N	N	Y	N	\$ 487,876
30" pipes	30	3372	0	7.5	0	0	0	0	8	12	0	0		N	N	Y	Y	N	N	Y	N	\$ 1,206,269
36" pipes	36	1071	0	8	0	0	0	0	8	4	0	0		N	N	Y	Y	N	N	Y	N	\$ 481,819
33" pipes	33	1106	0	7.75	0	0	0	0	8	4	0	0		N	N	Y	Y	N	N	Y	N	\$ 430,595
60" pipes	60	543	0	10	0	0	0	0	10	2	0	0		N	N	Y	Y	N	N	Y	N	\$ 403,909
Inlet Connect	0	0	0	0	78	0	0	0	0	0	0	0		N	N	Y	Y	N	N	Y	N	\$ 287,280
New Inlets	0	0	0	0	0	0	38	0	0	0	0	0		N	N	Y	Y	N	N	Y	N	\$ 172,368

Manheim Township Flow Removal

Groffs Run Restoration

■ Conceptual Restoration Capital Cost: \$5.3 M

- Estimate based on other projects of similar length and contributing area
 - ~\$1,900/ft for magnitude of contributing area and flow
- Consider hydrology:
 - Perennial water to function like stream, instead of a ditch to convey stormwater
 - Enough inflows to provide baseflow? (e.g., McCaskey)

Storm inflows
from
Manheim Twp
& City of
Lancaster



Manheim Township Flow Removal

Estimated Cost Summary

Project	Capital Cost (\$)			Life Cycle Cost (\$)		
	Total Cost (\$)	City Cost (\$)	External Cost (\$)	Total Cost (\$)	City Cost (\$)	External Cost (\$)
Baseline						
Manheim Township Separation²	\$18,596,000	\$2,546,000	\$16,050,000		\$2,718,000	\$17,704,000
<i>Separate Storm to Groffs Run</i>	<i>\$13,345,000</i>	<i>\$1,827,000</i>	<i>\$11,518,000</i>		<i>\$1,827,000</i>	<i>\$11,900,000</i>
<i>Groffs Run Restoration³</i>	<i>\$5,251,000</i>	<i>\$719,000</i>	<i>\$4,532,000</i>		<i>\$891,000</i>	<i>\$5,804,000</i>

Notes

- ² It is recommended that City of Lancaster pays only the incremental cost to increase size of sewer and stream to accommodate City flow
- ³ Conceptual cost variable based on site conditions and level of restoration